Strategy and instruments for a successful implementation of electromobility in Austria

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Abstract

Driven by the high share of renewable energy sources in national power generation Austria has defined electromobility as a political top priority. Public administrations are cooperating closely with industry and research institutions within the Austrian Association for Advanced Propulsion Systems (A3PS) and have elaborated the National Implementation Plan “Electromobility in and from Austria”, which provides a set of actions which have significant potential to facilitate the introduction and development of electromobility in Austria.

After the introduction the second chapter describes the market penetration of electric vehicles (EVs) and charging infrastructure and tries to analyse user preferences for buying a new car. It shows the ongoing trend towards electromobility and provides an overview on the market development of other alternative propulsion systems, energy carriers and the corresponding hydrogen and charging infrastructure. Since 2003, the stock of EVs has risen fifteen-fold (including 3,500 EVs and 13,000 hybrid vehicles).

The third chapter provides detailed information about regulatory conditions and funding programs in Austria and describes the successful implementation of model regions. The Federal Ministry for Transport, Innovation and Technology has a vital role due to its simultaneous responsibility for R&D-funding programs, infrastructure planning and transport policy framework conditions. An important reason for the dynamic increase of EVs in Austria is the mission oriented cooperation between engineering service providers, producing industry, fleet operators, policy makers and research institutions working together in defining roadmaps for joint actions and implementing them, coordinated by the A3PS and the Fuel Cell and Hydrogen Cluster FCH-Austria. Another asset is that Austria holds a very competent automotive supply industry working for all OEMs worldwide.

The third chapter emphasises successful ongoing projects and studies which brings electromobility closer to people and shows further future trends.

Keywords: Austria, electromobility, regulatory conditions, funding programs
1 Introduction

Electromobility (e-mobility) offers the opportunity to substantially reduce greenhouse gas emissions from transport and to create a sustainable, interoperable mobility system. State-of-the-art technology developed and produced in Austria contributes vitally to the gradual implementation of e-mobility in domestic, European, and international transport systems. Most of all, it helps to reduce emissions generated in transport, and thus to protect climate and environment.

The issue of e-mobility is understood to be an interdisciplinary potential of several innovation fields: energy, environment and transport. By implementing e-mobility, Austria has a highly favourable starting position owing to the commitment that is reflected in well-established research and support programmes, initiatives, and large demonstration projects, high technological know-how in enterprises, a well-developed transport system, as well as an efficient energy system featuring 70 per cent renewable energy in the power supply mix.

E-mobility in and from Austria is an enormous opportunity, mainly for the technology and business location Austria, so as to successfully position itself, with innovative state-of-the-art technology in the automotive and automotive supply industry, and with intelligent energy and mobility services, on international markets [1].

2 Market penetration of EVs in Austria

2.1 Vehicles on the road

In 2014, 8.5 million (mn) of people were living in Austria. Besides that, 4.7 mn passenger vehicles were on Austrian roads available.

A study (2014) about consumers preference for buying a new car pointed out that 72% of all Austrian drivers changed their driving behaviour due to increasing fuel costs (in the years before 2014). Thus, there is a significant trend towards increasing usage of public transport systems and car sharing models. In Austria, more than half of all journeys using cars lie within a distance of five kilometres, and more than 30% of all car trips end after only two kilometres. The study also analysed that every second car owner plans to buy a new car within the next two years, but 45% of them would not pay „more“ for eco-mobility. 37% of all Austrians prefer to buy a used car. Preferences for buying a new car are: conventional ones like diesel (50%) and gasoline (30%), followed by alternative ones like HEVs (15%) and BEVs (5%).

The trend towards an increasing number of alternative driven vehicles can also be seen at the current numbers of vehicles on Austrian roads.

According to Statistics Austria a total of 6,465,770 vehicles (including 4,694,732 passenger cars) were registered in Austria, as per 31. December 2014. Thus 395,637 motor vehicles were new registered in 2014. New registered passenger cars accounted for 303,318 - a decrease of 4.9% from 2013.

E-vehicles are gaining more and more popularity, especially HEV’s are very popular in Austria. A total of 1,281 BEVs (+95.9% to 2013) and 2,360 HEVs passenger vehicles (+10.4% to 2013) were newly registered in 2014. Furthermore 279 pure CNG vehicles, 515 bivalent and 3 FCV’s were newly registered in 2014 in Austria. Besides that, more than 180,000 e-bikes are used.

In numbers, these are a total of 12,822 HEVs, which feature an e-motor via an internal combustion engine (95% gasoline/ 5% diesel). The number BEVs increased to a total of 3,386 (63.6% to 2013) (compare Figure 1).

![Alternative Driven Vehicles](image-url)

**Figure 1:** Development of vehicles driven by alternative drivetrain on Austrian roads (2008-2014)

The number of vehicles driven by CNG (incl. bivalent) rose to 4,538 (23.83% to 2013). Taking into account the absolute number of new registrations based on alternative drivetrains (4,434 vehicles), their proportion of the total admission counts for 1.5% of all new registered vehicles.
2.2 EV supply equipment and charging infrastructure

Regarding the price development for diesel and gas, Austria is one of the cheapest countries within the EU. December 2014 was the cheapest month for refilling a conventional car since December 2010. As an annual average, Eurosuper costs € 1.11 (EU € 1.25) per litre at the petrol station; for diesel the price was € 1.08 (EU: € 1.19) per litre. By the end of 2013, Austria counted 2,640 conventional petrol stations. With about 3,200 persons per petrol station, Austria ranks in the European average, with Greece at the high end (1.705 persons/station) and Romania at the low end (9,811 persons/station). Beside conventional petrol stations, the number of alternative filling stations has increased in recent years (see Table 1).

Table 1: Filling stations for alternative fuels and conventional gas stations in Austria

<table>
<thead>
<tr>
<th>Filling station</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNG</td>
<td>146</td>
<td>175</td>
<td>179</td>
</tr>
<tr>
<td>LPG</td>
<td>32</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Biogas</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>E85</td>
<td>28</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>E-vehicle Public (Level 2 AC)</td>
<td>1,060</td>
<td>1,160</td>
<td>1,449</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vegetable Oil</td>
<td>19</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Conventional</td>
<td>2,575</td>
<td>2,515</td>
<td>2,640</td>
</tr>
</tbody>
</table>

Source: Fachverband der Mineralölindustrie, Mineralölbericht 2014

Today, there are approximately 178 public filling stations in Austria with CNG dispensers. Remarkably, Austria is currently the absolute champion in terms of number of CNG filling stations compared with the size of the country (best CNG coverage in Europe). Due to the fact that there is no “official” map of electric charging stations (EVSE) available in Austria, it is difficult to present a specific number. One EVSE can host several individual charging points. In Austria, EVSE’s are counted by the number of stations rather than the number of plugs in a charging station. There were 3,400 in total and 1,443 public charging stations (18 DC fast charging) installed as of December 2014.

3 Regulatory conditions and funding programs

The development of alternative drives and fuels has become a key factor in the competitive capability of transport and power engineering in recent years, since their implementation on an industrial footing secures the competitiveness of the automotive industry in particular as a global key sector and is also contributing to solving pressing environmental and transport policy problems. Austria’s automotive industry (see Figure 2) has been highly successful to date and is particularly affected by this issue, since over 175,000 employees work in this sector, mainly in the production and development of drive trains.

Figure 2: Topics of automotive engineering in Austria

Pushing e-mobility forwards in Austria is done by two main steps: the support through promotions and funding programs and the increase of the attractiveness of e-mobility by regulatory (legalistic) measures.

Since 2007, the Austrian government has more than tripled public funding in the sectors energy research, development and demonstration (RD&D); adopted a new energy research strategy and launched several priority programs. The major increase in public funding is a result of the Climate and Energy Fund supporting R&D in renewable energy and energy efficiency as well as market demonstration and deployment. In 2013, Austria’s public expenditure for energy-related research and development amounted to 124,545,848 euros [2] (see Figure 3).
The subcategories with the highest expenditures in 2013 in million (€) euros were: efficient residential and commercial buildings (about 16); electricity transmission and distribution (14.8); Photovoltaics (11.1); energy efficiency in industry (10.6); communities, smart cities (10); bioenergy (8.4); hybrid and electric vehicles (7.6); energy storage (4.8); hydropower (4.3) and production and storage of hydrogen (3.5). About 65% of the means were used for applied research, and 18% for experimental development. Basic research represented a small yet very important portion of 7.5%.

3.1 Austrian national policies

For the introduction of e-mobility, regulatory framework is a key factor. Thus, the state and communities offer many promotions such as purchase premiums. Many insurance companies provide a discount of 10 to 20% for EVs. For companies, associations & non-profit organizations, there is support of 30% of the environment-related investment costs for the acquisition and conversion.

Convention vehicles: since 2011 an increase of the mineral oil tax applies, which is + EUR 0.04/l for Gasoline and + EUR 0.05/l for Diesel. As compensation for drivers the commuting allowance was increased by 10%. In Austria pure biofuel is exempted from tax. Since December 2010 the tax rates for 1,000 liter fuel are: Gasoline: with a content of min. 46 l biofuel and a sulphur max. of 10 mg/kg = € 482, else € 515 AND Diesel: with a content of min. 66 l biofuel and a sulphur max. of 10 mg/kg = € 397, else € 425.

In 2008 the Normverbrauchsabgabe (NoVA), a uniquely bonus/malus system for CO2 and NOx emissions as well as particle filter, was introduced for the taxation on the acquisition of new vehicles. Since 2014 the calculation of the NoVA accords to the CO2 emissions of the car. New cars which cause <90 grams of CO2 per kilometer, don’t have to pay the NoVA. The excess amount (to 90) is divided by five and gives the NoVA tax rate. For vehicles with CO2 emissions >250 g/km, the NoVA increased by 20 € per gram of CO2. A car with 120 grams of CO2 would mean a rate of 6 percent ((120 – 90)/5).

Vehicles with alternative drive trains: until end of 2015, vehicles running on alternative drivetrains (hybrid drive, use of fuel specification E85, CNG, LPG, H2), receive a tax reduction of EUR 600 (USD 780.7). As of January 1st, 2013, the motor-dependent insurance tax for HEVs and Range - Extender has to be paid for the engine power of the combustion engine only, BEVs are exempt from the motor-dependent insurance tax.

3.2 Federal programs for funding and supporting advanced propulsion systems

To secure the competitiveness of Austria’s automotive sector for the long term, the Austrian ministry for transport, innovation and technology (bmvmt) has supported its preparation for emerging technological transformations under the A3 technology programme (“Austrian Advanced Automotive Technology”) since 2002 and under the successor programme A3plus since 2007. To facilitate the market launch of new propulsion technologies, in addition to supporting cooperative research projects as part of the calls for proposals for the A3 programme, bmvmt is also supporting the development of “flagship projects” as major pilot projects and demonstration projects, involving developers, manufacturers and also users of these technologies.

3.2.1 Austrian Association for Advanced Propulsion Systems (A3PS)

In 2006 the bmvmt established the A3PS as a strategic public-private partnership for a close cooperation between industry, research institutions and technology policy for the development and market introduction of alternative propulsion systems and fuels. The participation and the co-financing of A3PS through its member institutions is a strong signal towards the ministry for a strong
interest in this field. Furthermore, co-funding of the A3PS through the ministry provides a long-term security in planning investments due to a clear public commitment beyond election terms. A3PS is a strategic platform with a joint mission to develop efficient, competitive and clean vehicles as well as their energy carriers and infrastructure. Thus, it stimulates the cooperation of complimentary partners in order to overcome the “chicken and egg problem” between vehicle development and energy infrastructure build-up. It also aims to coordinate regional activities in Austria avoiding duplication and achieving critical mass in national and international perception. The A3PS is no funding instrument but provides a broad portfolio of services for its member institutions creating innovative framework conditions beyond funding individual R&D-projects. Thus, it supports industry and research through development-, cooperation- and information-management but runs no own research.

Strategies and orientations of the A3PS include:

- Promoting all alternative propulsion systems and fuels (including hybrid and electric drivetrains, batteries, fuel cells, CNG-vehicles, hydrogen, electricity and liquid / gaseous biofuels,...).
- Focus lies on automotive engineering and vehicle technologies but including ICT, material research as well as production and energy technologies.
- Mutual opportunities from and to other technology areas and fields of application (electronics, electric motors, cryoengineering, generators, aerospace, nanotechnology, rail-industry,...).
- Early phase of the innovation-cycle gives smaller countries and enterprises the possibility to gain a key role in the development of these technologies.
- A3PS supports its member institutions to find a fitting niche in the international development process.

The A3PS is dealing with the following objectives and tasks:

- **Networking:** Stimulation of R&D co-operations embedding Austrian industry and research institutions into national and international value chains.
- **Information:** Strengthening the competence of Austrian enterprises and research institutions by collecting, compiling and dissemination of information in a targeted way to the members of the agency.

- **Know-How Demonstration:** Presentation of technological know-how, engineering competence and products of the A3PS members in national and international conferences and policy initiatives.
- **Safeguarding interests:** Supporting the representation of Austrian interests in international committees and initiatives of the EU and the IEA.
- **Orientation:** Establishing a common view between industry, research institutions and technology policy by developing common strategies and roadmaps for the development and market introduction of alternative propulsion systems and energy carriers.
- **Explanation:** Providing well-founded and balanced advice for policy makers to support the optimisation of their policy instruments and to inform the public about the opportunities and perspectives of these technologies.

### 3.2.2 Mobility of the Future

Mobility of the future is Austria’s national transportation research funding program for the period of 2012–2020. The program has been developed and adopted by the bmvit based on national and European policy documents and relevant action plans, interviews with key stakeholders from a wide variety of backgrounds, consideration of roadmaps of technology platforms and of framework conditions as laws and regulations. It’s a mission-oriented research and development program to help Austria creating a transport system designed to meet future mobility and social challenges by identifying and refining middle- to long-term improvement ideas. The programme includes four complementary areas in which different research themes are addressed: passenger transport; transport infrastructure (roads, sensors, materials and supplies); vehicle technologies (hydrogen and fuel cell technologies, hybrid and battery-powered drives, alternative fuels) and freight transport (sustainable freight transport in towns and cities, sustainable solutions for 'First-/ last-mile', intermodal hubs, innovative conveyance and transport media). The annual budget amounts for around € 15 mn.

The latest call (2014-2015) with a budget of € 6 mn is focusing mainly on Fuel Cell and Hydrogen (FCH) projects. Thus, it points out the importance
and relevance of hydrogen in terms of Fuel Cell and Hydrogen Vehicles (FCV) in Austria.

Projects of the following areas are funded:
- Fuel Cell Components & Systems
- Hydrogen Generation for mobile applications
- \( \text{H}_2 \) Storage Technologies
- \( \text{H}_2 \) Supply Infrastructure
- \( \text{H}_2 \) Distribution
- System and Vehicle Integration

It is also the third call focus on FCH projects in Austria, based on the Strategy Paper of the FCH-Cluster Austria under the responsibility of A3PS.

### 3.2.3 FCH-Cluster Austria

Austria has a high potential to use renewable energy (sun, wind, water, biomass, geothermal energy...) for energy production and energy storage in mobility, in numbers these are 33% (as per end of 2013). Hydrogen is suitable for storing unsteady produced renewable energy. Furthermore, there exists a strong automotive supply industry with focus on propulsion systems (BMW, Opel/General Motors) in Austria. Austrian industry and research institutions are highly qualified in the field of hydrogen and fuel cells.

All fuel cell and hydrogen components and systems are covered in research and industry, but special expertise exists in:
- **Hydrogen tank systems** (cryogenic and high pressure from Magna for BMW and Daimler and for space applications)
- **SOFC-components and systems** (Plansee for Bloom Energy, APU from AVL, Treibacher for raw materials, TU Vienna and Leoben for SOFC-research)
- **Engineering, development tools and test bench** from AVL (PEM and SOFC)
- **Green hydrogen production** from biogenic feedstock as well as photovoltaics (Güssing, Profactor, Joanneum, TU Vienna, Fronius)
- **Hydrogen refilling stations** (in Graz with additional R&D-facilities, in Vienna from OMV building up network to neighboring countries)

In order to concentrate and to coordinate the Austrian knowledge and competence in the field of FCH the FCH Cluster Austria was initialized in 2012 and is coordinated by the A3PS.

The visions of the FCH-Cluster Austria are:
- Austria as qualified Supply Country for components, engineering services and development tools for FCH-Technologies
- Niches for Austrian products and services in existing Partnerships
- Development of the Hydrogen Technologies into a Business Segment
- Capable HRS-Infrastructure and Demo Vehicle Fleets in Austria
- Austria as international accepted research partner for FCH-Technologies

Additional e-mobility research activities in Austria are conducted under the funding programs in the Climate and Energy Fund. The Climate and Energy Fund has supported electric mobility in Austria since 2008, giving rise to numerous pioneering projects and initiatives in this field. Against this background, the Climate and Energy Fund commissioned an evaluation of its “Austrian Electric Mobility Flagship Projects” technology programme. The results of the analysis are excellent, testifying that the programme has been highly effective and plays a key role in bringing electric mobility as a whole closer to the market. The Climate and Energy Fund will therefore continue its successful “Austrian Electric Mobility Flagship Projects” programme.

The main research focus on vehicles, users and infrastructure will be extended by explicitly addressing innovative components for electric and hybrid drive trains including auxiliaries, and recycling issues. Due to the mission oriented nature of the Call, project applicants are entirely free to develop their own methods of creating technological solutions. The goal is to exploit the creative potential of Austrian companies and research institutions, and to involve more closely innovative SMEs and existing projects. In the long term this should lead to a reduction in the cost of vehicles, while simultaneously increasing their range and usability; this will further enhance the competitiveness and marketability of e-mobility. Funds of the Climate and Energy Fund includes the Lighthouses of E-Mobility and klima:aktiv mobil [3].

### 3.2.4 Lighthouses of E- Mobility

This program issued its last call at the end of 2014 with a budget of € 3 mn - focussing on Low-Emission Electric Vehicles. Further calls will

### 3.2.5 klima:aktiv mobil
This is Austria’s Action Program for mobility management to reduce CO₂ emissions, to promote environmentally friendly and energy efficient mobility and to stimulate new innovative business opportunities and green jobs. The program provides free advice and financial support to help businesses, fleet operators and property developers, as well as cities, municipalities, regions, tourism operators, schools and youth groups, to develop and implement mobility projects and transport initiatives, which aim to reduce CO₂ emissions. Between 2007 and 2013 more than 4,900 eco-friendly mobility projects were initiated. This enabled an annual emission reduction of 570,000 tonnes of CO₂. The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management has allocated a total of around € 12 mn to this program for 2014.

### 4 Successful sustainable projects
Because of the high share of renewable energy in Austria (33 %), e-mobility is an important element in the overall transport system. Therefore Austria profits for linking public transport systems with e-utility vehicles, e-scooters, e-car sharing and e-bikes with the goal to create an attractive combination of electrified private transport services with public transport. Thus, a lot of projects have been started in Austria within the last years.

#### 4.1 Linking private and public transport
According to the slogan "use instead of ownership", a various number of e-car sharing and rental models have been launched in Austria. First implementations for the establishment of e-car sharing fleets have been observed in 2014. Especially in urban areas, with well-developed public transport system, bicycle and walking infrastructure, these concepts are working very well. The interest for e-car rental concepts exceeded the supply by far, especially due hotels and commuters. Another form of car sharing includes electrical taxis (see Figure 4). The Technical University of Vienna made a comprehensive feasibility study on the economic impacts of BEV-taxis fleets in Vienna.

![Figure 4: e-taxi fleets with Tesla (image courtesy of Taxi 40100)](image)

The results showed that an upgrade of the existing taxi operation to BEVs could be easily realized in Vienna, although there are still a lot of hurdles to overcome, like the need for fast charging zones. Referring to this study, a few demo projects started in Vienna (Tesla) and Graz and Salzburg (Nissan Leaf). Vienna plans to have 60 e-taxis on the road at the beginning of 2015 (see Figure 4).

#### 4.2 E-mobility for commuters
Train operators still realized the possibility and benefits of integrated e-mobility for commuters. eMORAIL (Integrated eMobility Service for Public Transport) is a pilot project of the Austrian train operator ÖBB and offers a mobility package for commuters - from their home to their workplace (see Figure 5). It’s a systematic combination of public transport and electric individual transport (e-car, train and e-bike) for the first and last miles. eMORAIL was successfully implemented and tested in an approximately 16-month pilot phase. To ensure high vehicle utilization, e-cars were used operationally during the day.

![Figure 5: eMORAIL – combining car, tram and bike (image courtesy of ÖBB)](image)

#### 4.3 E-Scooters and E-Motorcycles
**E-Scooters and E-Motorcycles** are gaining on interest too. “iO” an Austrian company developed the E-scooter “iO King Kong”. With a driving range from 70km (fully packed – up to 180kg) to 140km they are successfully used by the Austrian Post Service. Another pioneer of e-mobility is the Austrian company Johammer, which developed “Johammer J1” (see Figure 6).
The e-bike is driven by a synchronous motor with an output of 11 kW, an empty weight of 178 kg, and a top speed of 120 km/h. The used batteries (12.7 kWh) enables a range between 150 and 200 km. The fast charging time for amounts for 2.5 hours (80%). In 2015 -150 pieces are expected to be sold. Due the trend towards an increasing number of cyclists in Austria, e-bikes are getting popular too. Thus, there are already about 180,000 e-bikes in Austria. They are the most popular EVs in Austria - in 2014, every 9th-selling bike was an e-bike in Austria.

4.4 Logistics

A few Austrian projects focussing the goal of electrical vehicles for urban freight logistics. CITYLOG EMF (Electric Multifunctional Vehicle) is one of them and has the vision of a holistic approach concerning the reorganization of logistic structures and the concomitant reorganization of the transport technology of goods in sensitive areas - made in Austria. The e-motor propulsion is fuel-cell (hydrogen) based and the vehicle concept consists of a series of ‘self-driven’ vehicles and ‘trailers’ that can be coupled to a train, and un-coupled for loading and unloading operations. Every vehicle is ‘driving’ itself, led by electronic signals to follow the trajectory of the first one, each vehicle is using its separate propulsion unit. Brake-energy will be saved and can be used if the vehicle needs more power. The serial production is expected to be ready in 2016 (see Figure 7).

A similar project - “EMILIA” “Electric Mobility for Innovative Freight Logistics in Austria” - aims of the development and experimental implementation of new e-freight logistics concepts for urban areas, by increasing range and reducing costs.

5 Conclusion

The relevance of e-mobility for Austria has been acknowledged regarding both economic and environmental aspects. In Austria, the issue of e-mobility is understood to be an interdisciplinary issue of the innovation fields: energy, transport and environment. The implementation of e-mobility in but also from Austria addresses mainly transport and energy systems so as to contribute to an affordable, demand-oriented mobility. Furthermore it aims to protect the environment. Austria’s automotive industry has been highly successful to date and is particularly affected by this issue, since over 175,000 employees work in this sector, mainly in the production and development of drive trains. Thus, research, development, and innovation up to the production of structural components, and system-integrated solutions open potentials employment for the automotive industry. Here, Austria has a highly favourable starting position. So as to implement e-mobility in the transport and energy systems in Austria, steps have to be consistently taken to launch and establish intelligent incentives systems on the market, raise awareness for new mobility solutions, and maximise positive impacts on the environment.

At the end of 2014, a total of 12,822 HEVs, and 3,386 BEVs (an increase of 63.6% in comparison to 2013) were counted in Austria. The number of vehicles driven by CNG (incl. bivalent) rose to 4,538. Taking into account the absolute number of new registrations based on alternative drivetrains (4,434 vehicles), their proportion of the total admission counts for 1.5% of all new registered vehicles. By using regulatory conditions and funding programs from different federal ministries Austria will take the further steps to successfully implement e-mobility in and from Austria.
References


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Since 1994 he is deputy head of unit “Transport Technologies” at the Austrian Ministry for Transport, Innovation and Technology being responsible for R&D funding programmes.

In 2006 he created the Austrian Association for Advanced Propulsion Systems as PPP supporting industry and research beyond R&D financing.

Michael Nikowitz was born in Vienna, Austria in 1986. He studied Robotics and graduated as a Master of Science in Engineering in 2011. After working as a Laser Scientist in the field of ultrashort pulse laser systems, he started to work as advisor for the Austrian Association for Advanced Propulsion Systems in the field of alternative driven vehicles. Since 2013 he is representing Austria within the International Energy Agency.